Preparing Rural Distance Education Preservice Special Educators to Succeed

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Abstract

A growing number of students living in rural communities access special education teacher preparation and professional development courses via technology-delivered distance education. Success in these courses depends on the effective use of technology to access information and course materials, complete and submit assignments, and communicate with instructors and classmates. To increase the likelihood that distance education students would have the needed technology skills to succeed as distance learners, program supports were implemented. Supports included a precourse distance learning workshop, on-line technology help files, and access to a technology assistant. Results indicated that student confidence improved in the use of technology skills addressed in the precourse workshop and practiced during the following semester.

Special education teacher shortages in the United States are critical, include all categories of special educators, and are not limited to any specific geographic region (Billingsley, 1993; Boe, Cook, Bobbitt & Terhanian, 1998; Brownell & Smith, 1992; Smith, McLeskey & Taylor, 2002). Shortages of certified special education teachers are most critical in rural areas of the country (Koury, Ludlow, & Wienke, 1991). The lack of even one special education teacher can put an entire small district in jeopardy (Thurston & Sebastian, 1996). Although the total number of special education teachers needed in rural areas is not as large as the number in urban areas, filling these open teaching positions may be more problematic (Thurston & Sebastian, 1996). Rural special education teachers may be difficult to recruit and may not stay as long in their positions thus creating higher levels of attrition and greater continual demand for teachers in rural areas. In a survey of 158 rural special education teachers, Westling and Whitten (1996) found that only 57% of the special education teachers surveyed reported that they were likely to be in their current positions in 5 years.

One solution to address the critical need for rural special education teachers is to train local community members to become special educators via distance education technologies (Collins, 1997; Menlove & Lignugaris-Kraft, 2001). One technology option utilized by a number of higher education special education teacher preparation programs is live, interactive televised distance education. Televised distance education courses are available in a variety of formats including slow scan, satellite delivery, interactive television, compressed video, video streaming, and internet-based audio video conferencing. A critical factor in the success of programs employing these technologies for course delivery relates to how skilled faculty and students are in using the program technology.

A variety and combination of technologies are often used to deliver rural distance education teacher preparation courses. Technology includes delivery hardware (e.g., codex, computers, LCD projectors, DVD or video systems, and audio hardware) and course and class management software used to support the delivery system. Distance education faculty also need email, chat, listserv, word-processing, and translation software to communicate with students in remote locations. Distance faculty must develop a working understanding of the delivery technology and course management and communication software while focusing on effectively teaching course content (Willis, 1995;

Meyen, Tangen, & Lian, 1999). In addition, faculty need to organize and track incoming papers electronically and develop systems for acknowledging receipt of papers and exams. Finally, faculty need to learn new techniques for communicating with distant students such as posting FAQ's (frequently asked questions) for student access, distributing information via bulletin boards or a listserv, and holding virtual office hours (e.g., chat rooms through instant messenger or course management software) (Spooner, 1999).

While there is a great deal written about distance education delivery and support technology and faculty skills needed for distance education (Bond & Finney, 2000; Collins, Schuster, Ludlow, & Duff, 2002; McIsaac & Gunawardena, 1996; Schnorr, 1999; Spooner, Spooner, Algozzine, & Jordan, 1998; Stubbs & Burnham, 1990) there is a much smaller body of literature that addresses the student skills needed to take advantage of these courses (Collins, Schuster & Grisham-Brown, 1999; Hora & Kling, in press). The primary student-related variable examined in much of the available literature is student performance in a course (DeLoughry, 1988; Moore & Thompson, 1990; Souder, 1993). Often these data are used to support the proposition that student performance in televised distance education courses is equivalent to student performance in traditional on-campus courses (Biner, Dean, & Mellinger, 1994; Biner, Welch, Barone, Summers, & Dean, 1997; Cohen, Ebeling, & Kulik, 1981; Paulsen, Higgins, Miller, Strawser, & Boone, 1998; Wade, 1999). There is also a growing literature that addresses student attitudes and perceptions about their electronic learning experiences (Biner et. al., 1994; Biner et al., 1997; Franks, 1996; Perdue & Valentine, 2000). However, none of these studies looks specifically at rural distance education students enrolled in special education teacher preparation programs.

Biner et al. (1994) argue that high levels of student satisfaction are important because they may contribute to lower program attrition and how much students learn within a distance education program. Of the seven dimensions underlying student satisfaction with college level television courses that Biner et al. (1994) identified, two dimensions addressed student satisfaction with obtaining course materials and communicating with instructors and other students. However, Biner et al. (1994) did not explore student confidence with technology skills that may underlie these satisfaction dimensions.

Other researchers reported student frustration with technology in distance education courses (Hora & Kling, in press; Owsten, 1997; Partee, 1996; Whitworth, 1999; Wulf, 1996). Even when websites and course webpages are developed to help alleviate problems associated with distributing course materials and communicating with instructors, the lack of technology skills needed to access the materials may create new barriers for some students (Hora & Kling, in press; Owsten, 1997; Schnorr, 1999). As exemplified in the following email from a student in a televised university special education teacher preparation course, the technology requirements needed to access information or communicate with instructors may increase demand to such an extent that students lose focus on the course content.

> *. . . I have been able to access the reading and I think I found the parents' guide and the transition articles for writing and knowing about IEPs, but to tell the truth, I am overwhelmed just trying to find this stuff—sorry. I think I'll get it but I tend to get so worried about finding it I can't think (Fuller, V., personal communication, May 22, 2000).*

In some programs even relatively simple tasks like asking an instructor an individual question may be dependent on the student's technology skills. Students who lack the necessary technology skills labor at a disadvantage relative to other students (Partee, 1996). This increased demand may lead to students dropping courses or performing poorly on activities or assignments necessitating technology-based communication (Hora & Kling, in press).

In a recent study, Osborne (2001) administered a self-assessment survey to 396 students participating in web-based and video conference delivered courses. Osborne reported that entry characteristics such as GPA and education level were important but not sufficient predictors of whether or not students would successfully complete the course. Importantly, survey items grouped under computer confidence and study environment were two of the strongest subscales in differentiating completing and noncompleting students and had high internal consistency.

Several researchers, who report student frustration with technology in distance education, suggest that it is critical for distance educational providers to ensure that sufficient technical training and support is available for distance learners (Owsten,

1997; Whitworth, 1999; Wulf, 1996). Support is critical when students begin a distance education program because that is when they are most likely to encounter problems and become disillusioned or frustrated with distance education (Owsten, 1997). Strategies for providing support include teaching students the needed technology skills prior to a course, providing online technology assistance, and providing technology consultants whom students may telephone. In some cases, faculty may need to embed technology skills into a course if students lack the necessary skills or equipment to access critical information (Schnorr, 1999; Stith, 2000).

In an attempt to address the supposition that distance education students who have the prerequisite technology skills and are confident in the use of those skills will succeed at a higher rate in distance education courses, the following study was conducted. The primary purpose of this study was to examine the extent to which precourse preparation and completion of a distance education course by preservice special education students in rural and remote sites would impact student ratings of their technology and information accessing skills. Preparation included a precourse technology workshop, help files provided on a course website, and access to a technology assistant. The secondary purpose of the study was to examine the extent to which distance education preservice special education students would feel confident with the technical skills needed to navigate the supporting course website, install software needed to download instructional materials, use e-mail and bulletin boards, and send assignments via fax or e-mail attachments in televised courses supported with electronic syllabi and websites.

Method

Program Background

This study addresses student perceptions of their technology and information accessing skills in the beginning phase of a distance education undergraduate special education degree/certification program. Program courses are delivered via a two-way audio video teleconferencing system. Courses are broadcast from a telecourse studio on Utah State University's main campus to seven remote locations throughout Utah. Of the seven sites, five are located in rural communities, and two are more than four hours driving time from the university. The televised courses are supported by a program website and course websites. Students may obtain course syllabi, supplemental course readings, study guides, handouts, and assignments from the course websites. For ease of distribution, all materials are provided in portable document file (PDF) format. Course syllabi, supplemental readings, and study guides may also be purchased by mail through the campus bookstore. Handouts, assignments, and readings found on linked Internet sites are only available through the course website. In addition, instructors may post answers to frequently asked questions to the website as a resource for students. The syllabi also include links to library resources, other websites relevant to special education, and WebCT course management tools. While the WebCT software package provides a broad array of tools including a bulletin board, chat tool, assignment drop box, test administration tools and grade management tools, only the grade management tool was used in this study.

Student Demographics

Initially 38 students were admitted to the distance education special education teacher preparation program. Three students dropped the program before fall courses started; two students withdrew from courses during the semester; and three students completed only one survey. Of the 30 remaining students, 27 participated in two courses and 3 participated in one course during the semester. The students in this program were typical of distance education groups described in the literature (Biner et al., 1997; Bremner, 1998; Dominguez & Ridley, 1999; Lalande, 1995; Mathews, 1999; Online, 1998). That is, the students were adults (average age was 35; 87% were female) who had additional responsibilities in their homes, families, and communities. While highly motivated to complete their undergraduate education and become licensed special education teachers, their time away from the university classroom and the additional responsibilities that may unexpectedly interfere with their studies placed them at higher risk than on-campus students for attrition and poor course performance.

Five students were licensed as elementary or secondary teachers; 13 students were working as paraeducators; 2 were teaching on emergency letters of authorization (students with bachelor degrees who were seeking licensure while they were teaching in public schools); and 10 students had no previous experience working in education. Twelve of the students had associates degrees; 5 students had

bachelor's degrees; and 13 had no postsecondary degrees.

Twenty-nine of the 30 students had a computer at home; 27 students had their computers for more than a year. Students' home computers ranged from relatively old computers (MAC 5400 and 6100s; expanded IBM 486) to new Pentium machines. Many students used their computers frequently. Seventeen students used their computers between 4 and 7 days a week, while 7 students used their computers between 1 and 4 days a week. Surprisingly, 15 students had home Internet access for more than a year, and only 7 students had no home Internet access.

Finally, 26 students told us that they had completed some coursework related to computer use, and the 4 remaining students had participated in school district technology training workshops. Students indicated that their courses and workshops addressed general computer use (n=24) word processing (n=20), e-mailing (n=20), and browsing the Internet (n=20). Only 15 students indicated that they had received any training using spreadsheets.

In summary, the majority of students were pursuing their initial higher education degree and special education teaching license. They were returning students with families and close ties to their local communities. The computer technology available in their homes varied greatly. Finally, they had received some introductory computer training either through a university course or local school district in-service training.

Survey

In the survey, students were asked to rank their skill with software and computer operations that were needed to access material from the course website on a scale of 1 (no experience) to 5 (highly skilled). Consistent with suggestions from the literature (Abernathy, 1997; Collins & Grisham-Brown 2001; Collins, Schuster, Ludlow & Duff, 2002; Philips, 1995), the necessary skills and computer operations were kept to a minimum. Software skills surveyed included questions about skill in using word processing, e-mail, Internet browsers, and Acrobat Reader. General computer operations questions included student self-assessment of skills in downloading software and other material from the Internet, installing software and browser plug-ins, attaching documents to e-mail, organizing files and folders on their computers, navigating webpages, reading academic text from the computer screen, and taking notes and annotating readings on their computers. Students were also asked to rate their skills in using three types of software not addressed in the precourse training workshop and for which there was no opportunity to practice provided within the course. Those included spreadsheets (e.g., Microsoft Excel, Filemaker Pro, Lotus), multimedia software (e.g., movie players, audio players), and instant messaging (e.g., Instant Messenger, AOL, ICQ).

Finally students indicated the extent to which they disagreed (1) or agreed (5) with statements about accessing information on the course website. These statements included:

Accessing the online syllabus was easy (e.g., finding site, setting up name, password).

The online syllabus was easy to navigate.

It was easy to access my grades through the online syllabus.

Course readings were easy to download.

Internet readings were easy to download.

Technology Skill Support

Technology skill support for students included a technology workshop prior to the course, online help files based on the skills taught in the workshop and access to a technology consultant. First, all students admitted to the special education distance education program were required to attend a one-day "Learning at a Distance" workshop before beginning their first semester of coursework. A technology consultant and a special education faculty member taught the workshop. The workshop included the minimum skills needed to set-up home computers to access and manage the instructional material on the course website. Students were taught to download and install an Internet browser and Acrobat Reader, set up a university e-mail account, navigate the online syllabus, download readings and study guides, and access their grades through WebCT. Students were also taught basic material management and communication skills including strategies for organizing course materials and note taking on their computers, conventions for naming course assignments and how to e-mail attachments to their instructors. Second, online help files were created and linked to course webpages so students could reference workshop material whenever they had a problem. For example, Figure 1 shows the instructions for saving and sending assignments provided from a link on one of the course webpages.

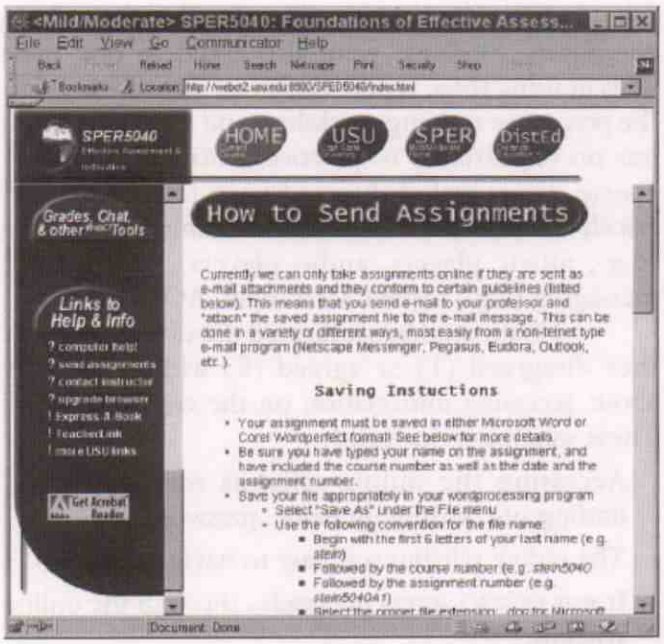

Figure 1: **On-line help file for sending assignments**

Third, students could e-mail or telephone the technology consultant if they needed assistance. The technology assistant accessed the students' personal computer information when giving assistance. The technology consultant also provided 10-minute mini-lessons at the beginning of televised courses if a number of students were communicating with him about a similar problem.

Procedure

Workshops were scheduled at two central locations, and all students enrolled in the course were required to attend one of the workshops. At the beginning of the workshop, students completed an initial survey that included demographic information and ratings on how skilled they were with various types of software and performing the targeted computer operations. Students completed the survey again at the end of the semester. In addition, students completed the series of questions related to accessing information on the course website.

Results

Survey data were analyzed for the 30 students who completed the "Learning at a Distance" workshop and the first semester courses and returned both of their technology surveys.

Student ratings on critical software skills, computer operations, and software skills that were not addressed in the workshop or the course are provided in Table 1. Correlated t-tests were used to analyze student skill ratings before and after the semester. In each category of software that students received training they rated their skill significantly higher at the end of the semester than at the beginning of the semester. Similarly, students rated their skill performing each targeted computer operation significantly higher at the end of the semester than at the beginning of the semester. No statistically significant differences in student ratings were observed for the software skills that were not addressed in the precourse workshop or the courses. On the post-course survey, students also evaluated the extent to which they had difficulty accessing information from the

Table 1: Software Skill and Computer Operation Ratings

Skill	Pre–Workshop Mean (SD)	End Semester Mean (SD)
Software Skill		
Word Processing	3.77 (0.73)	4.17 (0.80)*
E-mail	3.70 (1.05)	4.24 (0.79)*
Internet Browsers	3.60 (1.07)	4.03 (0.90)*
Acrobat Reader	1.83 (1.05)	3.39 (0.99)*
Computer Operation		
Downloading from the Internet	2.23 (1.01)	3.21 (1.14)*
Installing Software and Plug-ins	2.07 (1.01)	2.59 (1.11)*
Attaching documents to e-mail	2.17 (1.12)	3.86 (0.99)*
Organizing files/folders on your computer	2.67 (1.09)	3.52 (0.98)*
Navigating Webpages	3.33 (1.27)	3.86 (0.92)*
Reading academic text on your computer screen	2.90 (1.12)	3.48 (1.18)*
Taking notes and annotating readings on your computer screen	1.67 (1.06)	2.38 (1.05)*
Skills Not Addressed		
Spreadsheets	2.23 (0.93)	2.39 (0.80)
Multimedia Software	2.23 (1.25)	2.66 (1.20)
Instant Messaging	1.79 (1.27)	1.65 (1.01)

Correlated t-test – $p \leq 0.05$

course website (see Table 2). Students had very little trouble accessing and navigating the syllabus and looking up their grades on the WebCT server connected to the course. They did have some difficulty accessing course readings and Internet readings online. Twenty-one students described the specific problems they were having. Eleven students (53%) described problems related to hardware and software issues on their computers. Two other students noted that it was time consuming to download and print readings. This may be due to a slow modem connection on their computer. Finally three students said they had no confidence that they could download and then access the material.

Table 2: Accessing Information on the Course Website

	End Semester Mean (SD)
Accessing the on-line syllabus was easy.	4.59 (0.87)
The on-line syllabus was easy to navigate.	4.62 (0.87)
It was easy to access my grades through the on-line syllabus.	4.54 (0.93)
Course readings were easy to download.	3.93 (1.39)
Internet readings were easy to download.	3.96 (1.50)

Examples of student descriptions of hardware and software problems are provided in Table 3. It is important to note that while the problems in this sample all relate to hardware and software, none of them are exactly the same. It is likely that helping students with these problems would require individual attention.

Table 3: Sample Descriptions of Hardware and Software Problems

I tallied 28 hours with assistance. . . . Major problems with Acrobat Reader
I was having problems with my computer that caused my computer to crash. . . . I resolved this by getting a new hard drive. . . . it is taking time to get everything downloaded and set up.
Not enough RAM
Modem too slow
Netscape version was too old.
Some readings made my computer freeze

Discussion

Distance education delivery of teacher preparation programs to students living in rural and remote communities shows great promise in reducing the number of critically needed, highly qualified special educators in rural schools (Collins, 1997; Menlove & Lignugaris-Kraft, 2001). Owsten (1997) argues that technology skills are critical for students, including those living in rural areas, to take advantage of distance education. Many students may lack these critical technical skills needed to take advantage of distance courses that utilize technology for course delivery (Schnorr, 1999). In discussing the development of online instruction in special education, Meyen, Tangen and Lian (1999) indicate that it is important to minimize technical skills so students can access material "without technical or procedural complications" (p. 25).

Major Findings

First, this study helped identify primary and secondary core technology skills that students need to access information on course webpages that support distance education courses. Primary core technology skills need to be mastered for success in most electronic delivery systems. Secondary core skills may be idiosyncratic to the particular web design and instructional activities in the program's electronic delivery system. These skills are listed in Table 4.

Table 4: Minimal Technology Skills Needed for Success in Distance Learning

Primary core technology skills	word-processing e-mailing using an Internet browser
Secondary core technology skills	using Acrobat Reader downloading from the Internet (to obtain the Acrobat Reader software) installing the software and plug-ins reading academic text annotating readings on computer screen

Unfortunately neither Meyen et al., (1999) nor others have identified the minimal or core technical skills students need to access instruction within various electronic delivery systems. Additional research is needed to further identify core technology skills to enable distance delivery programs to develop materials that may be used by many programs to

assess and prepare students for distance education.

Second, this study identified successful methods for preparing and supporting distance students as they enter a technology-mediated distance education program. The methods include:

a precourse technology workshop,
help files provided on a course website, and
access to a technology assistant.

Clearly the students enrolled in the target distance education special education teacher preparation program improved their confidence in the technology skills addressed in the precourse workshop and practiced during the semester. The reverse was true for software skills that were not addressed in the workshop or practiced during the semester. The online help files provided a quick and easy to access method for refreshing the information and skills presented in the workshop. If students had questions or needed assistance with skills not taught in the workshop, they were able to contact the technology assistant. Initially, the assistant was bombarded with email and telephone questions. As the semester progressed and students became more confident and more skilled, the questions dwindled.

The technology training and assistance provided in this study directly addressed the reality that students entering distance education programs bring with them varying levels of technology expertise. Some needed only the workshop in which they learned the basic technology skills needed to participate in the distance education course. Others needed the workshop and a resource that could be accessed at any time to review the basic information and skills. Another group needed the presence of a human contact to answer questions, provide information, reteach basic skills, and guide them as they applied the skills in course activities.

For most students, the technology training and support was successful, and the technology skill requirements were not a barrier to success in the course. On course evaluations student concerns focused on clarity of assignments, amount of reading, and instructor interaction routines. There were few comments regarding technology demands or problems accessing reading material electronically.

Third, this study addressed the impact of practice and student preference on confidence with the use of technology skills. The amount of target skill practice during the semester also impacted student confidence in skill use. The two lowest rated skills, taking notes and annotating readings on the computer screen and installing software, were the skills that students practiced least during the semester. Most of the students indicated that they printed their reading materials and annotated text using traditional means (i.e., making margin notes in pen and using a highlighter). Several students indicated that they did not have time to sit at their computers to read course materials and take notes. They preferred reading material to be portable so they could study as they had free moments during the day. It is likely that installing software and plug-ins was not rated higher because students were presented only one opportunity to practice the skill—when they downloaded Acrobat Reader and installed the program on their computer. In contrast, student confidence in using Acrobat Reader improved a great deal—probably because few students had used the program prior to the course, and there were numerous opportunities to use the program since all the materials available for downloading were in PDF format.

Limitations

There are several limitations in this research that might be addressed in future research. First, students' perceptions of their technology skills are not necessarily consistent with their actual performance. It is possible that some students had the necessary technology skills before the precourse workshop but simply did not have confidence in their skills. After they participated in the workshop and courses and found that they could easily access the course materials, their confidence improved. Other students, who rated their skills highly at the end of the semester, might actually have poor technology skills. In future research, the student ratings collected in this study should be supplemented with performance evaluations of the needed technology skills.

Second, it is important to remember that these data reflect individual student perceptions of their skills. The actual skill level of students might vary greatly even though they both rate themselves similarly on a particular computer operation.

Third, the extent to which some or all of these skills are necessary for success in courses is not clear. Several students, who rated their technology skills low but did well in their courses, indicated in informal discussions that they had sons, daughters, husbands, or friends who helped them with the technology demands in the course. The common factor among all students is that they used one or

more strategies to reduce the response demand imposed by the technology. That is, some students improved their technology skills, other students improved their confidence, and others apprenticed themselves to family, friends and classmates. In future evaluations, it would be important to identify the range of strategies that students might use to help reduce the technology demands in distance education courses. Further studies might directly examine the effects of these strategies on student course performance.

Fourth, there is little information on the five students who dropped the program before fall semester courses or dropped the program during the semester. It is possible that several of these students dropped the program because they continued to have difficulty accessing course information. For example, at least one of the students who dropped the program during the semester did not have a home computer when she participated in the precourse workshop. Data from WebCT suggests that she never accessed the course website while enrolled in the course. Clearly, the lack of technology skills contributed to this student's poor performance and eventual withdrawal from the special education certification program.

Finally, the individual effects of the training and support components used in this study need to be evaluated. To what extent are all the components required to improve student performance on the necessary information accessing skills? Would the workshop and help files be sufficient or is the human assistance provided necessary for developing student confidence using those skills? Did students prefer one of the supports over the others? What support component did the students find to be most helpful or most essential to their success?

Conclusions

While not directly attributable to increased technology skill training and support, more students completed the distance education program than in past years. Attrition dropped from approximately 50% in previous cohorts to 37% in the cohort receiving the training. Other program changes may have also influenced the drop in student attrition. Changes included more careful screening of students to ensure that prerequisites courses were completed, rearranging the schedule for course delivery to provide a stronger foundation during the entry semester, and a stronger focus on special education content. The self-report data collected in this study needs to be supplemented with performance evaluations of the needed technology skills in order to examine the extent to which acquisition of those skills will in fact reduce program attrition. This study has helped define the variables that require further examination. It is clear, however, that trainees' technology skills must be fluent enough to "put them at ease" to focus on the knowledge base in the course.

The results of this study clearly indicate that the confidence level that distance education students report in regard to their technology skills does increase when they receive training and support. There is also some indication that distance education program attrition decreases when training and support are offered. Further study in this area will help to identify the core technology skills that are critical for student success in distance education programs.

To facilitate rural distance education student success, it is critical that designers of distance education programs determine the requisite technology skills needed to access the program, consider how the target technology skills will be taught and mastered before the program begins, and provide technology support throughout the program. By ensuring that students possess the requisite technology skills to access course materials, the focus in the class then becomes learning the course content rather than accessing the course content. Skill at communicating via technology also allows instructors and students to communicate freely and without restraint. Being able to successfully access course materials and communicate with instructors greatly enhances the success that distance education students experience and their confidence as distance learners.

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